The European Benchmarking Report on Quality of Supply

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• The European (regulated and deregulated) electricity market
• CEER - the Council of European Energy Regulators
• The Benchmarking report on quality of electricity supply
• Benchmarking on Continuity of Supply
• Cooperation IEEE and CEER
The European Electricity Market

Deregulated open market

Wholesale Market

Transmission

Electricity network

Distribution

Regulated monopoly

Retailer

Deregulated open market
European Energy Regulators

Council of European Energy Regulators

CEER is a “not-for-profit association” constituted by 32 independent national regulatory authorities (NRAs) aiming to facilitate the creation of a single, competitive, efficient and sustainable EU internal energy market that works in the public interest.

Agency for the Cooperation of Energy Regulators

ACER is established by the Regulation (EC) No. 713/2009 to be fully operational in March 2011 as an European Community body with legal personality, with the aim to complement and coordinate at EU-level the work of the NRAs and has its seat in Ljubljana.
European Network Codes

• Network codes are a set of rules drafted by ENTSO-E, with guidance from ACER, to facilitate the harmonisation, integration and efficiency of the European electricity market.
  – Requirements for generators
  – Demand connection code
  – Operational planning and scheduling
  – Electricity balancing
  – etc
CEER - organisation

Electricity Quality of Supply Task Force EQS TF

http://www.ceer.eu
Benchmarking Report

- Comparison of CoS for European countries
- Comparison of CoS, VQ and CQ regulation
- Recommendations to the stakeholders
Evolution of Benchmarking
Structure of the 5th BR

Classification

„non technical“ Quality

„technical“ Quality

Commercial Quality

Voltage Quality

Continuity of Supply
### Structure of the 5th BR

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Voltage Quality - EN 50160

- Electricity as a product
- Set of “voltage characteristics” as minimum requirements throughout Europe
- 10-minute averages
- 95% of time, for all customers
National regulation

- EN 50160 is often used as a basis
  - Measurement method
  - Objective values for harmonics

- Sharpening the requirements in different ways
  - 1 minute instead of 10 minutes
  - 99 or 100 % instead of 95 %
  - Different objectives for supply voltage variations
  - Regulation on voltage dips
Recommendations on VQ from BR5

• #1A: Further improve EN 50160 as a harmonised instrument for voltage quality regulation
• #2: Ensure individual voltage quality verification
• #3: Set reasonable emission limits for network users
• #4A: the scope of continuous voltage quality monitoring programs should be broadened
• #4B: exploit the possibilities offered by smart meters without excessive price increase for customers
• #5: define harmonized characteristics and indices for voltage dips
• #6: Ensure availability and regular publication of voltage quality data
Recommendations on CQ from BR5

• #1: Periodically review the national regulations of commercial quality
• #2: Enforce general standards of service in order to protect customers better
• #3: Properly prioritise the national regulations of commercial quality
• #4: Maximise the benefits of high tech developments for customers
• #5: Develop the regulation of customer relations
Continuity of Supply

Continuity of supply concerns interruptions in electricity supply.

In other words: CoS focuses on the events during which the voltage at the supply terminals of a network user drops to zero or nearly (practically) zero.

Continuity of supply can be described by various quality dimensions.
Benchmarking on Continuity of Supply I/II

Source: http://www.ceer.eu

Average annual interruption time for customers connected to distribution networks

Harmonized total SAIDI: Average annual interruption time for LV customers, all interruptions considered
- Last available year (2012 unless indicated otherwise)
- Average since 2008 (available years only)

Non-harmonized average annual interruption time, all interruptions considered
- Interruptions which originate from incidents on LV networks not taken into account, or average annual interruption time taking into account MV customers and weighted by average consumption
- Likely underestimated compared to "harmonized total SAIDI, by about 10-20%"
- Last available year (2012 unless indicated otherwise)
- Average since 2008 (available years only)

Latvia: 944 minutes in 2011, 853 minutes in average since 2008
Benchmarking on Continuity of Supply II/II

Source: http://www.ceer.eu
Continuity of Supply - CoS (I/IV)

- CoS is monitored in 35 European countries
  - **12/26 countries monitor short interruptions**
  - **17/26 countries consider incidents at all voltage levels in CoS**

  → Expand the monitoring of CoS

- CoS-Indicators, procedures for data collection vary across countries

  \[
  \text{SAIDI} = \frac{\sum N_i \times r_i}{N_T} \\
  \text{ASIFI} = \frac{\sum L_i}{L_T} \\
  \text{AIDI} = \frac{\sum N_i}{N_T} \\
  \text{MAIFI} = \frac{\sum L_i}{L_T} \\
  \text{CAIDI} = \frac{\sum N_i}{N_T} \\
  \text{CAIFI} = \frac{\sum L_i}{L_T} \\
  \text{ENS} = \sum E_i \\
  \]

  → Harmonise CoS indicators and data collection procedures
Continuity of Supply - CoS (II/IV)

- CoS improvements trend to become stable
  (planned/not planned; with/without exceptional events analyses in: graphical and table form)

  ➔ Investigate CoS trends for a periodic review of regulation
  (analyse trends of the economic results of regulation)

- CoS is affected by network characteristics
  (urban/suburban/rural areas - analyses in: graphical and table form)

  ➔ Assess disaggregated continuity data in order to identify priorities – e.g.:

  voltage level  groups of customer  by cause
Continuity of Supply - CoS (III/IV)

- CoS levels are affected by network characteristics (e.g. cable)
  significant correlation between underground cables and high CoS; several indicators are correlated (e.g. population density) – difficult to assess specific impact

  ➔ Promote cost-benefit analysis to improve the efficiency of expenditure on networks

- Incentive schemes are used to regulate CoS in distribution and transmission networks

  15/26 countries consider CoS in their regulation regime

  6 countries plan to introduce such a regime (DE, GR, LU, AT, RO, CZ)

  ➔ Implement an incentive scheme for maintaining or improving general continuity levels
Continuity of Supply - CoS (IV/IV)

• Incentive schemes for individual continuity levels are used in many countries and have different formulations
  18 countries have compensation schemes for single-user (2 have plans); schemes are not uniform: e.g. based on type of grid-user, sometimes the reimbursements are automatic

→ Implement compensation payments for network users affected by very long interruptions

• More countries participate in benchmarking CoS
  reduce the cost of obtaining information about regulation

Recommendation of 1st Report achieved completely

→ Continue in exchange of information on continuity of supply and its regulation
Conclusion and Outlook I/II

- Results are presented on the basis of facts
- Clear recommendations for future developments are given
- Further harmonisation in (i) data collection; (ii) indices calculation; (iii) quality analysis
- Further improvements of VQ standardisation (EN 50160)
- Implementation of Guideline of Good Practise on VQ-Monitoring
- Attention on Smart Meters
Conclusion and Outlook II/II

I. Investigate CoS trends for a periodic review of regulation

II. Promote cost-benefit analysis to improve the efficiency of expenditure on networks

III. Implement compensation payments for network users affected by very long interruptions

IV. Perform cost-estimation studies of voltage disturbances

V. The scope of continuous VQ monitoring programmes should be broadened AND make results available
Plans/ideas for the 6th BR on CoS

- Differentiation/definition on planned & unplanned interruptions
- Focus on causes of interruptions (e.g. cause of “fiber cabling”)
- Rules for time aggregation of interruptions
- Analysis on relationship of network performance and network structure
  - Clustered sizes of DSOs in relationship to the network performance
  - Improved questions on demand and distributed generation (classification of customers)
- CAPEX/OPEX relationship to quality performance
- Recommendations for density (urban/sub-urban/rural)
- Use of quality indicators in regulation (comparison of regulation regimes, use within regulation regime and/or efficiency benchmarking)
- Definition of “good” quality for CoS (in form of individual standards)
Cooperation IEEE and CEER

How a cooperation could look like?

Joint publication/paper?

Exchange of benchmarking results?

Exchange of experience?

suitable time and location to meet together?
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ANNEX – additional information
CEER Reports/Activities (II/II)

- “Towards Voltage Quality Regulation In Europe”
  ERGEG Public Consultation Paper - Dec. 2006
- “Towards Voltage Quality Regulation in Europe”
  ERGEG Conclusions Paper - July 2007
- “Towards Voltage Quality Regulation in Europe”
  Evaluation of the Comments Received - July 2007
- “Service Quality Regulation in Electricity Distribution and Retail” (CEER and FSR) - 2006/2007
- VQ Monitoring Workshop in Brussels Nov. 2009
- 1st Round Table CEER/EURELECTRIC
- CIRED 2009 + 2011 + June 2013
- “GGP on Estimation of Costs due to Electricity Interruptions and Voltage Disturbances” - Dec. 2010
- 2nd Round Table CEER/EURELECTRIC
CEER Reports/Activities (I/II)

- 1st CEER Benchmarking Report - 2001
- 2nd CEER Benchmarking Report - 2003
- 3rd CEER Benchmarking Report - 2005
- 4th CEER Benchmarking Report - 2008
- 5th CEER Benchmarking Report – 2011
  - CEER Benchmarking Report 5.1 – 2014 (CoS)
  - CEER Benchmarking Report 5.2 – 2015 (CoS)
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